

NEWS RELEASE

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ROM collections reveal 500 million-year-old monster predator

Hundreds of fossil fragments pieced together solve
one of the greatest mysteries of the Burgess Shale



A reconstruction of *Hurdia victoria* based on the latest understanding of this Cambrian predator. (Drawing by Marianne Collins) © AAAS, 2009

(Toronto, Ontario – March 17, 2009) Collaborative research led by experts from Uppsala University in Sweden, along with colleagues from the Royal Ontario Museum (ROM) and the British Museum, have solved a century-old mystery within the ROM's Burgess Shale Collection, the largest collection of its kind in the world. An article featured in the **March 20, 2009** issue of *Science*, the world's leading journal of original scientific research, describes the long-misunderstood 500 million-year-old creature, *Hurdia victoria*, to be just one part of a complex and remarkable new animal that illuminates the origin of the largest group of living animals, the arthropods. The discovery was made by comparing misidentified fossil fragments to those in the ROM's collection to reveal what was once a formidable predator in the Cambrian Seas.

“Finding a complete fossilized animal is extremely rare. Soft tissues tend to decay rapidly after death, and harder parts tend to disarticulate or break into pieces, often leaving very few clues as to what the original animals looked like,” said Dr. Jean-Bernard Caron, ROM Associate Curator, Invertebrate Palaeontology. “The work of the palaeontologist is then much like that of a forensic expert at a crime scene; all the bits and pieces can be used to reveal the identity of the long defunct animals.”

Although the first fragments of *Hurdia victoria* were described nearly a century ago by Charles Walcott, the scientist who first discovered the Burgess Shale, they were assumed to be part of a crustacean-like animal. It was not then realised that other parts of the animal were also in collections, but had been described independently as jellyfish, sea cucumbers and other arthropods. However, ROM collecting expeditions led by Dr. Desmond Collins in the 1980s and 1990s uncovered more complete specimens and hundreds of isolated pieces that led to the first hints that *Hurdia* was much more than it seemed. Interestingly, one of the best-preserved specimens turned up in the old collections made by Walcott at the Smithsonian Institution, Washington D.C. This specimen had been incorrectly interpreted as a portion of the famous monster predator *Anomalocaris* in the 1980s, but it was in fact the animal *Hurdia*. Without the ROM specimens as reference to the experts, this specimen would have remained misidentified.



A fossil of *Hurdia Victoria* from the ROM's collections.
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The new description of *Hurdia* shows that it is indeed related to *Anomalocaris*. Like *Anomalocaris*, *Hurdia victoria* had a segmented body with a head bearing a pair of spinous claws and a circular jaw structure with many teeth. But it differs from *Anomalocaris* by the possession of a huge three-part carapace that projects out from the front of the animal's head. "This structure is unlike anything seen in other fossils or living arthropods," says Allison Daley, the team's lead researcher from Uppsala University, who has been studying the fossils for three years as part of her doctoral thesis. "The use of the large carapace extending from the

front of its head is a mystery. In many animals, a shell or carapace is used to protect the soft-parts of the body, as you would see in a crab or lobster, but this structure in *Hurdia* is empty and does not cover or protect the rest of the body. We can only guess at what its function might have been."

Hurdia and *Anomalocaris* are both early offshoots of the evolutionary lineage that led to the arthropods, the large modern group that contains the insects, crustaceans, spiders, millipedes and centipedes. They reveal details of the origins of important features that define the modern arthropods such as their compound eyes and limbs. As well as its bizarre head structures, *Hurdia* reveals exquisite details of the gills associated with the body, some of the best preserved in the fossil record. Most of the body is covered in the gills, which were probably necessary to provide oxygen to such a large, actively swimming animal.

The Burgess Shale (a UNESCO World Heritage Site in Yoho National Park, British Columbia, Canada) has yielded exceptionally preserved fossils that present a remarkable snapshot of Cambrian marine life. This timely new discovery marks the 100th anniversary of the discovery of the Burgess Shale, commemorated with a major international conference on the topic in August in Banff, Alberta, organized by the ROM. The final piecing together of *Hurdia*, together with a string of other major discoveries, show that this most famous of all fossil deposits has many more secrets to reveal as it enters its second century of research.

A Fossil Paradise: The Discovery of the Burgess Shale by Charles D. Walcott

The ROM celebrates the 100th anniversary of the Burgess Shale's landmark discovery by presenting ***A Fossil Paradise: The Discovery of the Burgess Shale by Charles D. Walcott***. The exhibit explores the Burgess Shale's early excavations, including vintage panoramic photos, site artifacts and a profile of the man who made the great discovery as told by his personal field notes and letters. *A Fossil Paradise* is presented until April 26, 2009 on Level 2 of the Hilary and Galen Weston Wing, next to a display of fossils from the ROM's own storerooms. Included in this exhibit is one of the best preserved *Anomalocaris* specimens anywhere in the world.

The ROM is a major contributor to the study of the Burgess Shale and the fascinating creatures found therein. The Museum has led dozens of field explorations and excavations since 1975, and now holds the world's largest collection of Burgess Shale specimens, over 150,000 specimens in total. Today, ROM curator Dr. Jean-Bernard Caron continues to lead field expeditions and to conduct research on Burgess Shale fossils. Highlights from the ROM's extensive Burgess Shale collections will be on permanent display in the future Peter F. Bronfman Gallery of Early Life.

“The Burgess Shale anomalocaridid *Hurdia* and its significance for early euarthropod evolution”, was co-authored by Allison Daley and Graham Budd (both Department of Earth Sciences, Palaeobiology Programme, Uppsala University, Sweden), Jean-Bernard Caron (Associate Curator, ROM, Toronto), Gregory Edgecombe (Natural History Museum, London) and Desmond Collins (Retired Senior Curator, ROM, Toronto).

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The Royal Ontario Museum (ROM) is an agency of the Government of Ontario.

Opened in 1914, Canada's largest museum combining both natural history and world cultures holds six million objects in its collections and presents public galleries showcasing art, archaeology and natural science. Renaissance ROM is an ambitious expansion and heritage renovation project that reasserts the Royal Ontario Museum as one of North America's great museums and a leading cultural attraction for the city, province and country. Renaissance ROM continues until 2010 with several new and renovated galleries to be created at the Museum. For 24-hour information in English and French, please call 416.586.8000 or visit the ROM's web site at www.rom.on.ca

ROM tickets now available online: www.rom.on.ca